Tribhuvan University

Institute of Science and Technology

2079

✡

Bachelor Level/First Year/First Semester/Science — Full Marks: 60

Bachelors in Information Technology (ORS 255) — Pass Marks: 24

(Operations Research) — Time: 3 Hours

Candidates are required to give their answers in their own words as for as practicable.

The figures in the margin indicate full marks.

Section A

Long Answer Questions

Attempt any TWO questions. **[2x10=20]**

1. Solve the given Linear Programming Problem (LPP) by using simplex method and interpret the results. [10]

   Minimize Z = 25A + 10B

   Subject to constraints:

   A + B = 50

   A ≥ 20

   B ≤ 40

   Where, A, B ≤ 0

2. Find transport schedule to minimize the transportation cost for the following transportation problem. The transportation cost per unit and units demanded and available are give in the table. [10]

From / To	A	B	C	Units demanded
X	9	10	10	5
Y	10	14	8	20
Z	13	10	8	20
Units available	20	15	10	45 / 45

3. The table give below give the information about the activities, their predecessors and time duration required to complete the activities of the project. [10]

Activity	A	B	C	D	E	F	G	H
Predecessor	-	-	A	B	A,D	B	C,E,F	G
Time in weeks	5	12	6	3	2	6	14	22

Draw the network diagram and identify the critical activities and critical path. Also find the minimum time duration required to complete the project.

Section B

Short Answer Questions

Attempt any EIGHT questions. **[8x5=40]**

4. Kathmandu Metropolitan is putting up bids for four used motorbikes company. The Metropolitian allows individuals to make bids on all four motorbikes company but will accept only one bid per individual. Four individual have made the following bids (in thousands Rs). [5]

Individuals	Motorbike Company			
	Honda	Hero	Bajaj	Yamaha
A	100	90	110	90
B	110	100	95	95
C	105	95	90	105
D	115	100	95	100

Make the use of Hungarian method to assign the individuals to different motorbike company in order to maximize the revenue.

[Contd…]

5. A milk salesman estimates the probability of the demand for a litre of milk is as follows:

Demand	11	12	13	14	15
Probability	0.10	0.15	0.30	0.25	0.20

He purchase a litre of milk @ of Rs. 60 and sells it @ of Rs. 70. Prepare payoff table and find optimum stock by using EMV criteria assuming the unsold milk has no scrap value. [5]

6. On the average 96 patients per 24 hours day require the emergency servie in clinic. Also on the average, a patient requires 10 minutes of active attention. Assume that the facility can handle only ine emergency at a time. If this situation satisfy all the conditions for apply queuing theory, find the average (expected) queue length and the waiting time for the patient to be served. [5]

7. Determine the best strategy for each players A and B and value of the game. [5]

Player A's strategy	Player B's startegy			
	B_1	B_2	B_3	B_4
A_1	40	40	40	40
A_2	30	30	20	50
A_3	10	30	90	20

8. The following tables gives the three kinds of foods and three kinds of vitamin contained on them. Formulate objective function and constrains of LPP for minimizing the cost. [5]

Vitamin	Food			Daily Requirements
	F_1	F_2	F_3	
V_1	20	10	10	300
V_2	10	10	10	200
V_3	10	20	10	240
Cost per unit of food	Rs. 20	Rs. 24	Rs. 18	

9. Describe modified distribution (MODI) method used for testing the optimality of initial solution of transport problem. [5]

10. What is called a queue? Describe the operating characteristics of the single channel queuing model. [5]
11. The following activities must be completed in order to complete the project. Draw network diagram to reflect the inter relationship between activities of the project. [5]

Activity	P	Q	R	S	T	U	V	W	X
Prececessor	-	-	P, Q	Q	P	R	T, U	S, U	V, W

12. Write short note on: [2.5x2=5]
    a. Scopes of operations research
    b. Dominance Rule Method in game theory